Name: _____   Date: _____
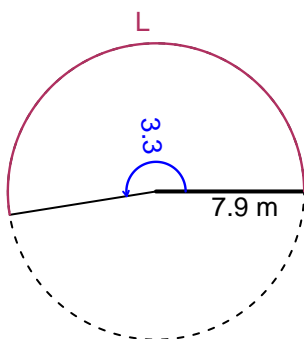
Trig Final (SLTN v661)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 7.9 meters. The angle measure is 3.3 radians. How long is the arc in meters?
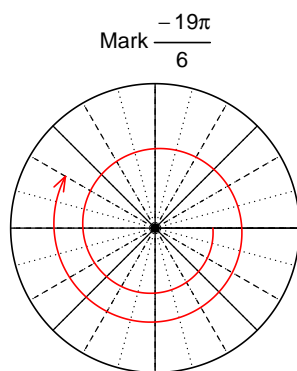

$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$
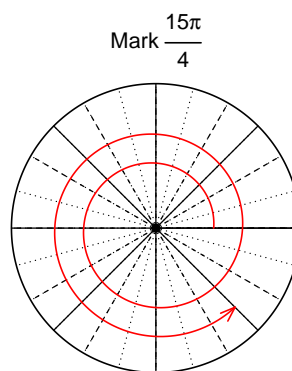
$L = 26.07$ meters.

Question 2

Consider angles $\frac{-19\pi}{6}$ and $\frac{15\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{-19\pi}{6}\right)$ and $\sin\left(\frac{15\pi}{4}\right)$ by using a unit circle (provided separately).

Mark $\dfrac{-19\pi}{6}$

Find $\cos(-19\pi/6)$

Mark $\dfrac{15\pi}{4}$

Find $\sin(15\pi/4)$

$\cos(-19\pi/6) = \frac{-\sqrt{3}}{2}$
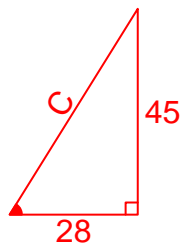
$\sin(15\pi/4) = \frac{-\sqrt{2}}{2}$

Question 3

If $\tan(\theta) = \frac{-45}{28}$, and θ is in quadrant IV, determine an exact value for $\sin(\theta)$.

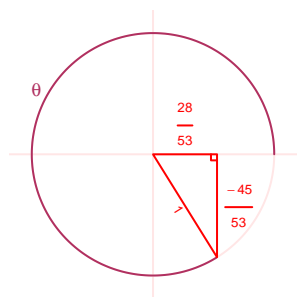Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.

Solve the Pythagorean Equation

$$28^2 + 45^2 = C^2$$
$$C = \sqrt{28^2 + 45^2}$$
$$C = 53$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.

$$\sin(\theta) = \frac{-45}{53}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 8.49 Hz, an amplitude of 6.02 meters, and a midline at $y = -3.69$ meters. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -6.02\cos(2\pi 8.49t) - 3.69$$

or

$$y = -6.02\cos(16.98\pi t) - 3.69$$

or

$$y = -6.02\cos(53.34t) - 3.69$$